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ABSTRACT

This booklet presents an overview of various techniques for remote education presently being used in Australian schools. It is intended as a teacher's resource, introducing the topic and promoting the development of contacts and establishment of communication links. Following a brief history of remote learning in Australia, the distance education methods are described. Many descriptions include examples of uses, contact persons using the method, hardware needed, and typical costs. The section on audio learning methods includes audio tapes, telephone, teleconferencing, a telephone amplification system, and one-way and two-way radio. The visual learning methods discussed are television, video tapes, interactive videodiscs, CD-ROM, computer-supported learning, video conferencing, microwave video, and UHF video. Electronic methods described are facsimile, electronic mail, bulletin boards, the electronic writing board, databases, computer managed instruction, and the electronic classroom. The section on transmission links includes the telephone line, satellite, packet radio, microwave link, Integrated Services Digital Network (an upgraded telephone network), and HF/VHF radio. Curriculum ideas and professional development models are noted and the use of technologies in the Australian states and territories is summarized. This booklet contains about 100 references and a glossary. Appendices list Australian educational radio stations, describe distance education teaching methods, and provide over 100 contacts. The accompanying videotape (not included) shows students and teachers using telecommunications and electronic equipment in educational settings. (SV)

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Remote Schooling & Information Technology

(A Guide For Teachers)

Joan Robson
Peter Routcliffe
Robert Fitzgerald

RC018606

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Remote Schooling & Information Technology

(A Guide For Teachers)

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Cover Photograph - Microwave receiver/transmitter at Glossop Primary School, South Australia

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1. INTRODUCTION

Teachers and students face unique challenges in the provision and delivery of education to remote locations. Since our early beginnings with innovations such as School of the Air, educators have sought ways and means of minimising the very significant barriers of long distances and isolated geograhical location. More recently additional pressures have been placed on remote education such as increasing curriculum offerings, providing access to information resources usually located in larger population centres, providing more effective communication and making more efficient use of limited teaching resources. In a recent report, "Creating a national communications framework for educational delivery" the Australian Education Council noted,

> *"Distance and education continue to present considerable obstacles to students in rural Australia to an equitable access of a similar range and scope of educational courses as is offered to their metropolitan peers. Even for students who have access to educational institutions the growing demand and acceptance of the need for training and continuing education has placed additional demands on member systems. This has led to an examination of alternative strategies for the provision and delivery of education and training."*
>
> *(Australian Education Council, 1991)*

In general, education has looked to technology to provide these "alternative strategies" and while technologies such as radio and television have played a significant role in education, it is only more recently that the potential of the new information and communication technologies has begun to be realised. While these technologies have applications in the teaching/learning area they also have a role to play in professional development and administration. Many educators working in this area are positive about the contribution this technology can make to many areas in education though most would agree it is not a complete substitute for face to face contact. With the increasing use of technology as a vehicle for education in isolated areas it is important that pre-service teachers, practising teachers and those involved in teacher education are aware of prevailing trends and developments.

This booklet presents an overview of a variety of techniques for remote education presently being used in schools. It is intended as a teacher's resource to help introduce the topic, develop contacts and begin the vital step of establishing communications links . Our purpose has been to describe rather than evaluate. Not all the examples are from isolated schools or of isolated students, but could be applicable to such situations. The original proposal was to survey current uses of telecommunications and electronic learning in schools over the Eastern states. This has been extended to encompass initiatives in all parts of Australia. The emphasis is on education at primary and secondary levels but some examples outside these areas have been chosen where the technology and learning have wider relevance.

In this document we begin with a brief history of remote education, then overview audio, visual and electronic learning methods. Current transmission links are described and some examples of their use are provided. From discussions with teachers we explore teaching techniques that relate to this technology. The next section notes current developments across Australia with a summary of projected developments. Finally, we note some concerns relating to our brief observations. A list of contact names and addresses is given in Appendix E. The accompanying video shows students and teachers using telecommunications and electronic equipment in educational settings.

Throughout Australia groups and individuals are developing innovative technologies. All too often the wheel is re-invented. It is hoped that this kit will encourage both communication and exchange.

2 BRIEF HISTORY OF REMOTE LEARNING IN AUSTRALIA

Australia, with a population spread thinly over a vast area, has always been at the forefront of developments in distance education. In 1910 the University of Queensland was founded to serve the needs of a predominantly rural population. The University of Western Australia followed in 1911.

The School of the Air has long been an example of the use of technology in overcoming isolation. Adelaide Meithke conceived the idea in 1945 to supplement children's correspondence lessons using the Traeger transceiver sets that were in most outback homes. The first School of the Air opened in Alice Springs on 8th June 1951. The number grew to thirteen schools catering for more than two thousand children over an area approximately half of Australia. More recently most Schools of the Air have been absorbed into their state systems enabling stronger integration in the delivery of the curriculum. For instance, the NSW Correspondence School has been decentralised into seven regional centres west of the Great Dividing range of NSW and the Broken Hill School of the Air is part of one of these regions.

Following the Second World War and in response to the returning ex-servicemen there was a rapid growth in external studies in the tertiary sector. The University of New England emerged as the country's major provider of distance education courses and was developing internal/external concurrent courses. With the burgeoning number of tertiary institutions in the 1970s the proportion of external students also rose. The mergers of the late 1980s and the rationalisation of the number of distance education providers have resulted in growing professionalism in this area. The universal need for strong interaction between the lecturer and students has prompted experimentation with newer technologies as an aid in distance education. Formal evaluation of their use is in its infancy.

At the school level, in 1980, South Australia was experimenting at Elliston Special Rural School using a handset, loudspeaker, telephone, slow-scan television and a facsimile machine. In 1982 as part of the Country Education Project, Telecom linked the children in a small country class with speakers from various parts of Australia. The Northern Territory was trialling, in 1983, staff communication using teleconferencing facilities - a boon for widely separated teachers. In the same year Computer Pals Across the World was set up to facilitate communication between schools electronically.

Recently the trend has been to group schools together into clusters, cells, districts or hubs to facilitate administration among schools. The installation of telecommunications within a hub or cluster has enhanced delivery of the curriculum. In some states the administrative grouping came first, in others the grouping to facilitate the use of telematics led the way. Currently teachers have the technological capacity to instruct students at remote schools and at the base school simultaneously.

3. EDUCATIONAL TECHNOLOGY

3.1 AUDIO LEARNING METHODS

3.1.1 Audio tapes

These are used as an integral part of many learning packages. They can be listened to, played and replayed in the student's home and form an important part of the learning materials of the Correspondence schools.

3.1.2 Telephone

While useful, regular use of the telephone in distance learning can be expensive. The use of 008 numbers is increasing in this regard.

A telephone tutorial is an organised discussion between the teacher and student covering course work using telephones. (Gledhill, 1988)

> *A costing done in 1988 for the University College of Southern Queensland telephone tutorials averaged at $4.20 per student per session. (Timmins, 1988)*

3.1.3 Teleconferencing

Teleconferencing is the use of telecommunications to link widely scattered individuals or groups so they can participate in discussion or presentations in real time. Voicepoint, DUCT and Multipoint have all been developed by education departments or commercial firms as economical teleconferencing microphones/loudspeakers suitable for schools. An electronic bridge allows multi-point conferencing to occur without requiring a Telecom operator to connect each party in turn.

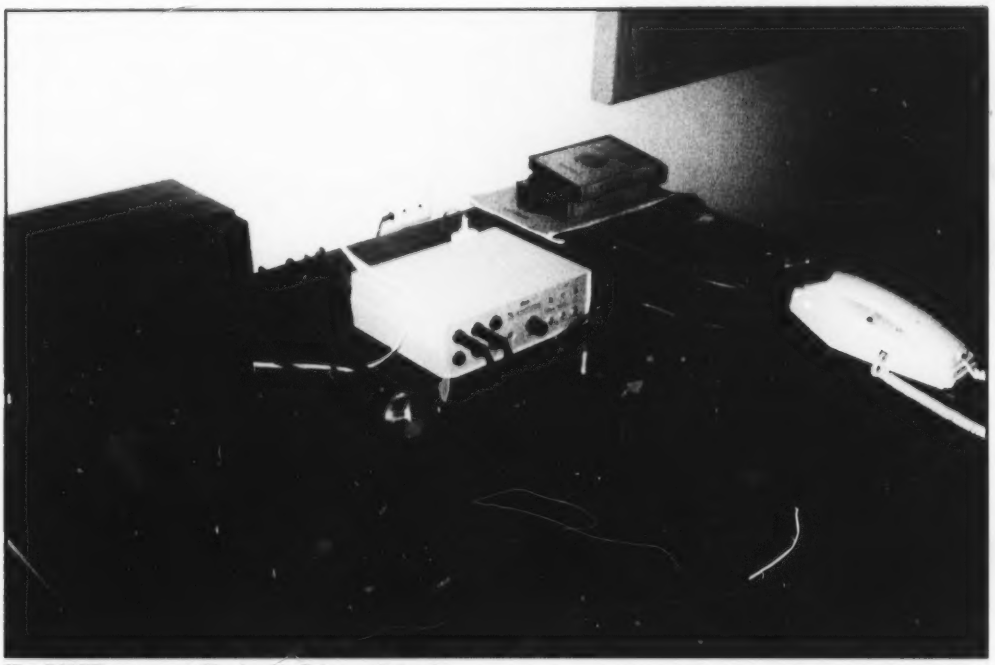
Teleconferencing is used by distance education teachers to supplement the written, audio and visual material sent to students. In some cases the teleconference takes place daily, in others less frequent. Teleconferencing allows sick children, travellers or itinerant children to still take part in the lessons.

Typical use	Queanbeyan Distance Education School
Level of students	K-6
Summary of uses	Weekly half hour sessions for each subject
Subject areas	All
Contact person	Kim Hawes, Queanbeyan Distance Education School
Other contacts	Michael Hall, Karabar Distance Education Centre.

Teleconferencing at Karabar Distance Education Centre.

3.1.4 DUCT

The DUCT (Diverse Use of Communication Technology) system was developed by the Technology Centre of the South Australian Education Department in 1980. It is now used widely throughout Australia to teach, at both primary and secondary levels, subjects as varied as Photography, German, Italian, Accounting, Medieval History, Technical Studies and Natural Resource Management.



The DUCT system at Glenburnie Primary School

The microphone input and amplification system drive a loudspeaker which is voice-switched with the microphones acting as a powerful loudspeaking telephone. There are add-on facilities such as student response indicators, headset mixers, modems and facsimile machines. The student response indicator allows the teacher to identify each student directly when that students press the assigned number on their keypad. This system is currently used in Victoria, NSW and South Australia. It can be utilised in any of three configurations. (see diagram).

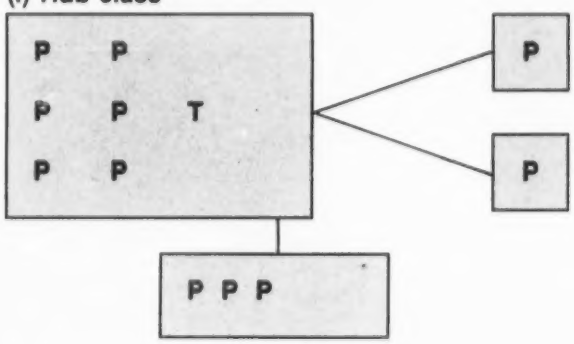
At present a DUCT system may be purchased from Innovation Management Pty.Ltd.. It costs between $800 and $1000 to set up depending on attachments.

Typical use

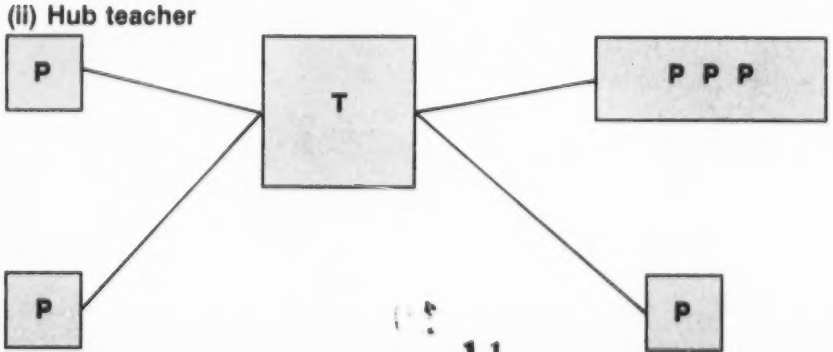
At Peak Hill in NSW, as part of the Western Region Access Program, DUCT is being linked with a Telecom bridge and teleconferencing facilities to link seven sites covering 40000 sq km. The teacher conducts the lesson from one of the sites with students concurrently on-site and at remote locations. Two bridge systems are located at Peak Hill. Each bridge can teleconference a lesson with five schools ringing in, and Peak Hill can be the sixth. At times when seven schools are involved, the system consists of two bridges which are connected. Each school has DUCT system, microphone, external speaker, facsimile machine, headset mixer and headsets.

Other contacts: *Communications Branch, South Australian Department of Education.*
John Cain, Glenburnie Primary School
Peter Fairchild, Grant High School
Ros Bell, Peak Hill Central School
Steve Cole, Grant High School
John Kirk, Adelaide College of TAFE

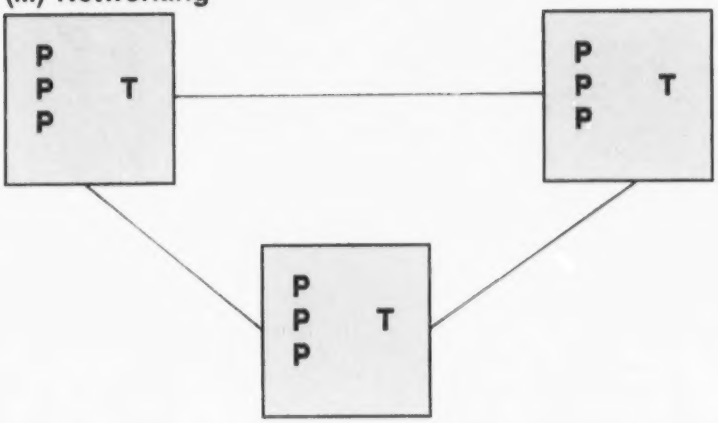
(i) Hub class



(ii) Hub teacher



(iii) Networking



3.1.5 Radio

One way

Course specific educational material is broadcast using regular radio facilities at scheduled times. The ABC still broadcasts a limited number of school programs. However the number is decreasing and will cease in 1991.

There are educational public radio stations operated by higher education institutions. Under their licensing agreements a proportion of their broadcast time is devoted to education. Their main purpose is to provide radio programs of an educational, informative and cultural nature. They also engage in related activities, contribute and respond to social, cultural and educational developments. (see Appendix A)

Typical use:

> 2SER is one of the public educational radio stations. In a program called "Talking to New England", lecturers in distance education units from the University of New England conduct talkback sessions on their subject using a broadcast radio and a 008 number to respond to calls from all over NSW. Such programs reflect the wide range of courses offered at the University of New England and is of value to general listeners as well as external students enrolled in the course. Students have reacted very favourably to the broadcasts.

Two way

The various Schools of the Air use HF radio links enabling teacher and students to hear each other. Distance education by this means involves the home tutor, the learning materials supplied and the interaction between the distance education teacher, the home tutor and the student. The principal medium for education of isolated children is still the printed word transmitted by Australia Post. School of the Air lessons take less than one hour of the time given daily to study.

The equipment used in some of the schools to transmit and receive radio broadcasts is currently being upgraded to VHF. New VHF equipment is also being installed in the NSW Western regions Distance Education Centres.

Typical use:	Cobar School of Distance Education
Level of students	K-6
Summary of uses	Twice weekly class sessions covering key learning areas. Twice weekly interest group sessions. Assemblies and supervisors' time with teachers.
Subject areas	All
Hardware	Telex Modec 752 loudspeaker/microphone, Conferlink 6
Contact person	Julie Johanson, Cobar Distance Education Centre.
Other contacts:	Tim McLeod, Port Augusta School of the Air

A teacher using VHF equipment at Cobar Distance Education Centre.

3.2 VISUAL LEARNING METHODS

3.2.1 Television

The NSW Department of Education produces 30 minute TV-Ed programs for distribution throughout Australia usually on SBS. The target audience ranges from pre-school to tertiary.

Programs are available by telephoning - Canberra (06) 295 4391, Melbourne (03) 628 2121, Perth (09) 4444 0055, Sydney (02) 240 8903, Adelaide (08) 227 0249, Hobart (002) 307 206.

Imparja Aboriginal Television has a proportion of educational broadcasts which are of great benefit to the people in the Central Australian region. The production cost of a specialised program for students in the Tri-State Project: improving Aboriginal student learning outcomes through co-operative services, in 1990, was shown to be expensive.

Live television programs during which students communicated with the presenter have been offered. This format was used in the Queensland Satellite Trial and is currently used in the IBM in-house training system ISEN. Both of these have been expensive to operate.

3.2.2 Video tapes

Educational video tapes contain course specific visual material and can be played by the student on a standard video cassette player at a time of the student's choosing. In many cases arrangements can be made for a player to be lent to the student for the duration of the course. The Homestead Video Service of South Australia, the Queensland Electronic Learning packages and the Queensland Satellite Trial are examples of the effective use of video for children who are beyond the range of television. Appreciation of the video material was expressed in the evaluation of the Queensland Satellite Trial and in the 1985 evaluation of distance education undertaken by the University of Western Australia.

The Open Access College at Marden, SA has developed sophisticated facilities in order to produce quality printed, audio and video materials for its students.

Contact Margaret Beagley, Open Access College

3.2.3 Interactive videodiscs

These discs together with a disc player and usually a computer allow children to interact with text, graphics, audio and video. Some Australian examples have been 'Ask the workers' a career education package and 'Aussie Barbie' a situational English disc. Adelaide College of TAFE is active in the production of these discs. A typical videodisc player attachment to a computer costs less than $1200.

Contact John Kirk, Adelaide College of TAFE

Overseas companies such as National Geographic produce a wide range of videodiscs such as 'Rain Forest' for less than $50.

3.2.4 CD-ROM

CD-ROM discs have a format similar to the compact discs used for music. They store vast amounts of data and may be accessed using a computer and a disc reader. To access the data a personal computer (Macintosh or IBM Compatible) with peripherals and a CD-ROM drive are needed. This would normally cost less than $3500. A hard disc is not necessary but will improve performance.

Newer discs with high quality graphics and sound are becoming available. Companies such as Apple and National Geographic are producing a wide range of CD-ROM discs. These require a hard disk and a mouse.

Electronic Learning Centres in Queensland, for example Palm Beach High School, are using CD-ROM in social studies and other areas.

CD-ROM discs are available through companies such as Light Years Ahead or INFO-ONE International Pty. Ltd.

CD-ROM changers hold up to six removable CD discs. Up to seven changers can be networked from the same controller for massive storage without manual intervention.

A CD-ROM network using Opti-Net software is used at Morley Senior High School allowing several users simultaneous access to the same CD-ROM disc.

Contact Bob Spence, Light Years Ahead.

3.2.5 Computer-supported learning

There are many educational programs available for use with computers.The method of presentation ranges from traditional drill and practice through problem solving to open ended inquiry.

Laptop computers at Coombabah Primary School

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The advantage is that when used interactively computer-supported learning allows students to obtain immediate feedback while they are still actively involved with the cognitive processes.

All states/territories promote the integration of computers into the school curriculum in a variety of areas such as language and social science. For instance, in Queensland many primary and high schools have been set up as Electronic Learning Centres using a variety of computers. In some regions these are set up in particular classrooms rather than setting up a computer room. Class sets of laptop computers have been purchased independently in some secondary schools and also have been made available to two project primary schools.

Contact Bev Pacey, Gold Coast Education Centre

In the Northern Territory laptop computers are used by students at the School of the Air and the Correspondence School.

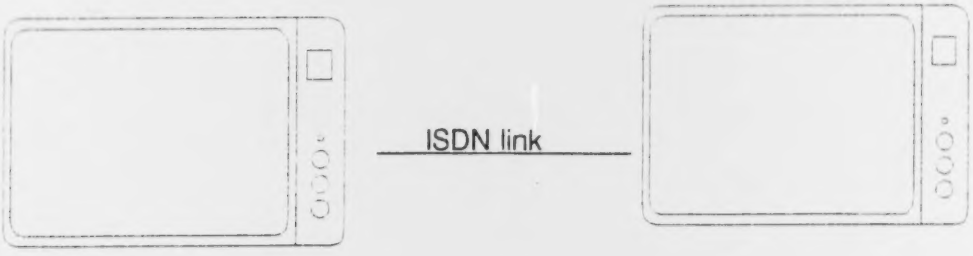
Contact David Stewart, Northern Territory Department of Education.

Sunrise schools in Victoria and Queensland use laptop computers in many subject areas. Constant evaluation of their effectiveness is being undertaken by the Australian Council for Educational Research.

Contact Greg Grimmett, Coombahah State School

3.2.6 Video conferencing

Video conferencing allows two-way audio and visual links between the teacher and pupils. It can range from a situation where the teacher can hear the class at the same time as they can see and hear the teacher to the scenario of each remote group/ individual seeing and hearing each other group/individual by using multiple screens.



South Australian TAFE colleges use a satellite link (shortly to be converted to an ISDN link to transmit two compressed video images from either end using 2Mhz cables). The nine site video-conferencing network is due to be implemented in 1991. (TAFE Channel, 1991) Costs are currently $1800 per hour with $150,000 to fully equip each room at each site.

Talkback television will use ISDN telephone technology to link into the Aboriginal owned Impaja Television for the transmission of a wide range of interactive talkback television courses via satellite. The courses will be delivered from electronic classrooms within the TAFE channel or from other locations having video conferencing facilities.

Contact John Kirk, Adelaide College of TAFE.
Contact Leigh Horton, Port Augusta College of TAFE.

In the Northern Territory compressed video via satellite is used at Batchelor College and Northern Territory Open College.

Contact Peter Toyne, Northern Territory Department of Education.

Telecom supports video-conferencing facilities.

Contact Telecom (008) 039 030.

Trunkline makes a modular unit for video conferencing. It allows for audio and visual links with one screen and camera at each end linked over an ISDN line. Each unit costs approximately $85,000 with the running costs being the normal telephone charge.

Contact Malcolm Lovell, Trunkline.

3.2.7 Microwave video

This uses a microwave link to send video images short distances. Presently it is being used in South Australia. The cost is less than $3000 for each end of transmission with an additional cost for installation. The operating cost, apart from licence fee is negligible.

Contact Communications Branch, South Australian Department of Education.

3.2.8 UHF video

This has been used in a trial to conduct live video lessons between Bribie Island and Cape Moreton Lighthouse in Queensland. The equipment used at each end was a video camera, two television sets, a portable UHF transmitter and a portable antenna. The frequencies used were 426Mhz and 1250Mhz as allocated by the Commonwealth Department of Transport and Communications to amateur television operators. Transmission costs were considerably lower than those currently applied using satellites. An evaluation report Bidirectional television classroom link is available from Bruce Cifuentes, Brisbane School of Distance Education.

3.3 ELECTRONIC METHODS

3.3.1 Facsimile

Many schools take advantage of the simplicity of facsimile communication to enhance learning. Other schools use it in conjunction with facilities such as DUCT or Electronic Classroom to transfer documents quickly. A typical combined telephone, facsimile machine, answering machine with conference facilities is available from Panasonic, model KX-F120BA. Newer facsimile machines are able to send information rapidly to multiple sites. The South Australian Department of Education has connected facsimile machines in banks linked to regions so that every school in the state can be contacted by fax within 30 minutes. The NSW Department of School Education has a facsimile machine in every school (2226) and uses Telecom's Faxstream facility for rapid delivery.

Contact Communications Branch, South Australian Department of Education.

Facsimile machines are being used as part of the classroom in the NSW Access Program at Peak Hill, Ardlethan and Moree.

Contact Ros Bell, Peak Hill Central School.

The Correspondence School Telematics unit in Victoria is making considerable use of audio/graphics (audio/facsimile/computer) in delivering lessons to secondary students in small rural schools and to some isolated students. Presently approximately 75 lessons each week are delivered using this method.

3.3.2 Electronic mail

Electronic mail (E-mail, e-mail, email) acts as an electronic postal service allowing users to send and receive messages. Computers using telephone line, cable or satellite are used to post and read these electronic messages. In a communication network, usually one large central computer acts as a mail exchange where messages are sorted and stored until the addressee 'logs on' and collects the mail.

Electronic mail improves the students' ability to work collaboratively in developing and sharing ideas, advice and information, and supports the process approach to writing with drafting, revising and editing. Students are writing for a real audience and reading real material. One of the most consistent comments made by the children in the Queensland Satellite Trial was how much they enjoyed communicating with their New Zealand peers. Teachers are able to capitalise on such motivation.

Students are encouraged to prepare their messages using a word processor. This has several advantages:

the writer has time to ensure that the text is correct
the writing process of draft, edit and final copy can worked through
it is far more cost effective to prepare text before logging on so that text is sent quickly from disk at a faster speed than typing.

Documents prepared in this way can be saved and transmitted as ASCII files. These can be interpreted by any computer, making it possible for schools to be involved in communication no matter which brand of computer is used. Some electronic mail packages come with a simulation package to enable the children to become competent users off-line. There are several electronic mail services which schools can use. Where STD rates apply the network may use AUSTPAC which is considerably cheaper. STD and interstate users can use AUSTPAC by dialling one of the following numbers; the number dialled depends on the baud rate setting for the user's modem:

Baud	Number	Baud	Number
300	1921	1200/1200	01922
1200/750	1923	2400/2400	01924

As an example when AUSTPAC answers type .NEXUS or .KEY1, etc., depending on the electronic mail service.

1. Telecom's electronic mail service is known as Keylink. Registered users can send messages addressed to one or many users by name. Many state education departments have Keylink electronic mail networks such as EDUCATION.QLD or EDU.NSW. Access is usually organised into three categories - school, student and individual. In NSW all mailboxes can communicate with each other, but only school mailboxes can communicate outside the EDU.NSW system. Schools organise connection to Keylink and get a Keylink address.

Schools such as Lord Howe Island Central School use Keylink to communicate with the mainland. Contact Bob Brown, Keylink address LORD.H.I.C.

Schools in Queensland access Keylink through EDUCATION.QLD and a specific training manual has been produced by Telecom.

The Australian Educational Telecommunications Calendar is sponsored by Telecom Plus and lists the educational telecommunications projects across all curriculum areas. Through this members of Keylink are able to join in events such as Characters On-line, Sport Link, Who's On-line, River Report, Price Watch, etc.

Contact Carole Green ot Learning Technology Services, Department of Education, QLD.

Keylink enhancements include the sending of facsimiles anywhere in the world and the connection to services such as AAP news service and online databases.

Contact Vicky Lowery, Management Information Services, NSW Dept. of School Education.

2. 'Computer Pals Across the World' pairs schools for regular communication via electronic mail. OTC's Dialcom is the overseas carrier. 'Computer Pals Across the World' offers a structured approach to pen pals. It provides students with a real context in which to improve their written communication skills. It encourages introductory letters, report writing, exchanging poetry, newspaper articles, written dialogue on social issues and scripts on myths and legends. The use of each school's resources by the other may also be effective in preparing an assignment needing information that is found in the area of the twin school. The current costs are a fixed $560 pa which include all national and international electronic mail charges, all data network charges, all administration and up to 100 blocks of storage. Curriculum applications /programs include:

writing for a real reason
gifted and talented exchange
video letters
business education
universities
museums
international study of adolescence
hearing and seeing in a new way
foreign language fellowship
hospitals
senior citizens

Contact Malcolm Beazley, 'Computer Pals Across the World'.

3. The FrEdMail network was set up in California and now has nodes in Australia. Its primary function is to transmit student writing from one place to another providing real audiences and purposes to motivate writing. The annual subscription to FrEdMail for nodes is $60.Users pay no online charges.

Contact Greg Butler, FrEdMail Australia. See Appendix B for details concerning NEWSDAY.

4. South Australia's NEXUS electronic information service incorporates electronic mail, bulletin board, CHAT (featuring a two-way chat facility), data bases, some utility programs, facsimile transmission facilities and soon international electronic mail.

To use NEXUS apply for a NEXUS application form from Angle Park Computing Centre, Trafford Street, Angle Park, SA 5010, (08) 243 5606, fax (08) 347 1781. The NEXUS telephone number is (08) 347 0822.

5. Another electronic mail service is 'National Geographic Kids Network' from the USA. Using this, children conduct research, record the data on the computer, share their findings with other schools overseas. A professional scientist examines the data generated by the students and helps them look for patterns in their findings.

Contact Karol Media, USA.

Minimum equipment

The following are the minimum requirements:

Personal computer
Modem (1200/1200) or 2400/2400 if possible to minimize online time
Compatible communications software eg. Apple Access/Microsoft Works
Telephone connection. This should not be on the Commander system but a single user line or a direct line such as that to the school canteen or Principal.

Additional equipment

The following additional resources should be considered:

overhead projector and data projection panel for display to large groups
a word processing package
a second disk drive
printer for a copy of messages
a hard disk
suitable furniture, especially appropriate chairs.

Costs

Assuming that the computer, overhead projector and telephone line are already available at the school, the remaining items could be purchased for under $3500. Some of the new equipment such as the overhead data projection panel could be used also in other areas.

Macquarie University has costed the use of Keylink electronic mail to conduct weekly tutorials as $14 per student per unit per semester for a class of 60 students (Gledhill, 1988).

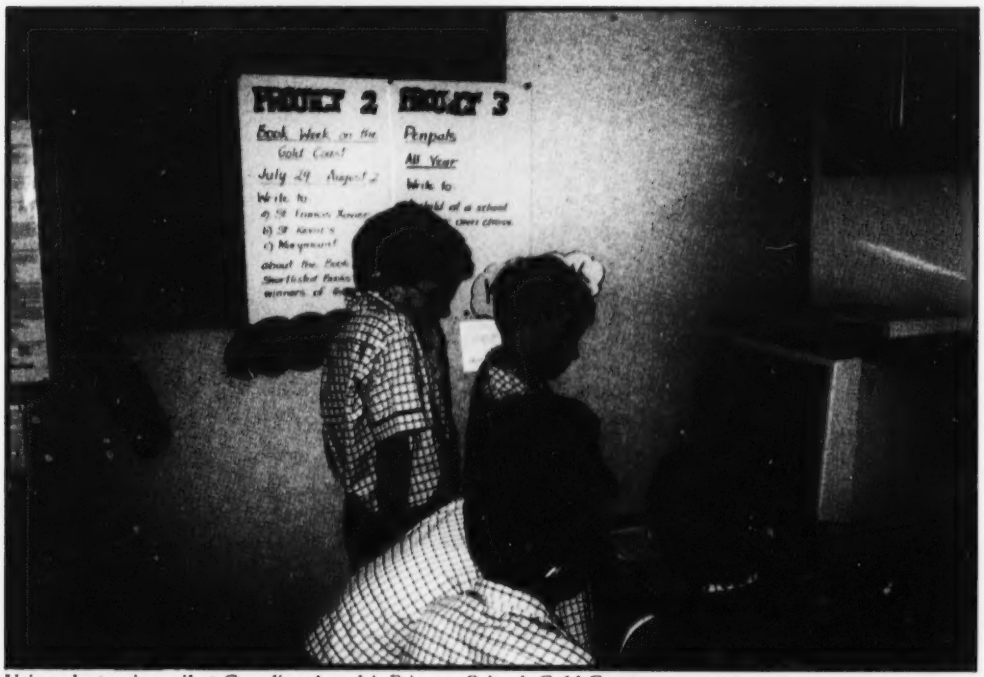
Keylink involves a $15 connection fee and approximately $30 a month for 10 months of the year. Online costs average $21 per hour.

Classroom uses

1. **Communication with students in other schools** such as pen pals letters, continuous story writing, communication in other languages or oral history projects. It is becoming increasingly common for students at all levels of education to send their assignments for comment or correction using electronic mail.

The Mathematics Teachers Association of the Northern Territory conducts a joint on-line quiz night in Alice Springs. Up to twenty teams of secondary school students in teams of five or six students with some from Great Britain or Japan competing.

2. **Collection of data from a wide audience.** Surveys can be undertaken using electronic mail with the potential to provide a wide audience for the collection of information. The survey can be prepared and uploaded to any number of schools. The system needs to be checked only after the required return date. More information is available on the Australian Educational Telecommunications Calendar.



Using electronic mail at Guardian Angels' Primary School, Gold Coast

Typical use:	Kaleen Primary School
Level of students	5
Summary of uses	Process writing, word processing, Computer Pals Across the World
Subject areas	Language, social science
Software	Microsoft Works
Hardware	IBM XT, Epson printer, AUTEX modem
Contact person	Don Nethercott
Other contacts:	Dave Day, Hawker College Terry Grogan, Brisbane Catholic Education Office Carmel Wikman, Guardian Angels' Primary School Bill Newman, Sadadeen Secondary College Janice Cherubini, NSW Department of Education

3.3.3 Bulletin Boards

The electronic version of a bulletin board allows messages to be posted and read by all users. Bulletin boards use electronic mail which allows any number of users to read or respond to messages. The advantage of a bulletin board is that users do not need to know the address of the audience. Bulletin boards require the use of a computer, a modem and a communications software package. In a communication network or association, one large central computer usually acts as the organiser where messages are stored until the addressee 'logs on', at which time the messages are available to read or reply. Messages stay on the system for a prescribed number of days and are then removed. If a teacher wishes to ask for information, assistance or make an announcement , a message can be posted on a bulletin board. In this way bulletin boards enable the sharing of ideas by a large group of teachers and students.

Using Keylink and EDU.NSW, the NSW Department of School Education has a bulletin board for teachers called FORUM and a similar one, STUDENTS, for students. Other boards have been set up as support for syllabuses such as COMP.ST which provides information and support by teachers for teachers of Computing Studies.

The electronic bulletin board offers the opportunity to establish contact with a wide range of students living in different environments. The ensuing communication, requiring explanation and description, forces the writers to look at familiar surroundings with new insights. The use of conference writing has proved to be very successful.

Data gathering from such a wide audience has been shown to be an innovative method of involving students in the collection of primary source material. This was done by a group of students in NSW setting up a database on the Great Depression.

An economics teacher set up a database on FORUM on types of businesses run in the local area and the influence of the particular locality on the business. A bulletin board message invited others to participate in order to enlarge the coverage.

Some bulletin boards are NOTICE, STUDENTS, ATARI.NEWS, APPLE.NEWS, BBC.NEWS, MAC.NEWS, MICROBEE.NEWS and TANDY.NEWS.

Contact Vicki Lowery, NSW Department of Education.

Minimum equipment

As for electronic mail.

Additional equipment

As for electronic mail.

Cost

Assuming that the computer and telephone line are already available at the school, the remaining items could be purchased for under $1000. Some of the new equipment such as the printer could also be used in other areas.

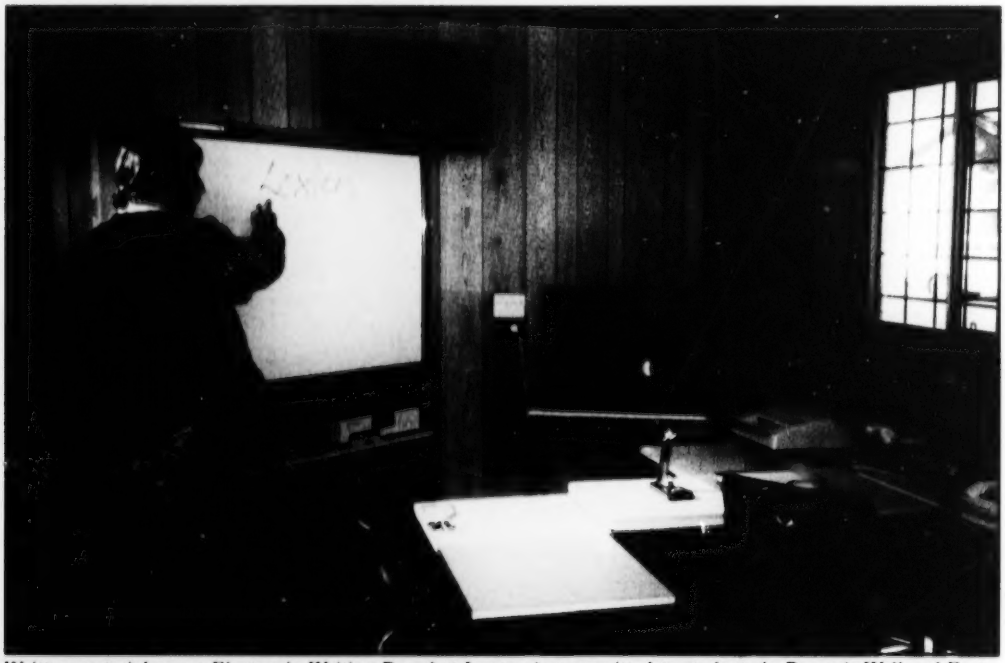
Keylink involves a $15 connection fee and approximately $30 a month.

Macquarie University has costed the use of a bulletin board for student/staff tutorials as $70 per student per unit per semester for a class of 60 students. (Gledhill, 1988)

Typical uses:	Phillip College, ACT
Level of students	11,12.
Summary of uses	Chats, electronic mail, Edunet, AAP
Subject areas	Computer Studies, Social Studies.
Software	Remote Access 0.4
Hardware	IBM Clone, Maestro modem, 70M hard disk.
Contact person	Michael Sisley, Phillip College.
Other contacts:	NEXUS, South Australia,

3.3.4 Electronic Writing board

This equipment can transmit characters, colour, graphics and drawings that are hand written on the special whiteboard or pad. Transmission is seen live on a monitor or overhead data projection panel at a remote site. The equipment can be adjusted internally for either standard or high-resolution operation to match the performance of the monitor TV or projection screen used. A built-in floppy disk drive enables pre-recorded data to be used or current data saved.



Written material on an Electronic Writing Board at Loxton is transmitted to students in Brown's Well and East Murray schools.

This system is operating in nine sites in country and metropolitan schools in South Australia linked by normal telephones and modems. Using this method children study German, English, Mathematics and Social Studies from Years 8-10 with three schools over 60km apart, linked concurrently. In one triangle the teacher's school at Loxton has the Electronic Writing Board, television monitor and a control unit containing a floppy disk drive connected by a modem to a telephone line. At the student end there are small graphics tablets, television monitor and modem on the telephone line. The teacher's written material to be seen on the students' monitors and the students' written material to be seen on the teacher's monitor. A facsimile machine is used to send and receive written work. Voice contact is via DUCT on another telephone line.

Contact Communications Branch, Education Department of South Australia.

BEST COPY AVAILABLE

An Electronic Writing board is manufactured by NEC as the EB 300 Series Writing Board System. Costs are approximately $5000 for the board, $5000 for the control unit, $1000 for each attached graphics tablet for the students, $1200 for the facsimile machine, $500 for the modem, $2000 for the DUCT system and microphones plus the telephone line and call.

Contact NEC, Lawrence Scott.

3.3.5 Data bases

Most state electronic mail networks such as EDUCATION.QLD, South Australia's NEXUS or EDU.NSW promote access to public and commercial data bases either directly or indirectly. The uses vary from curriculum and resource information for teachers to student study use. The use of these data bases in schooling has been extensively trialled and is part of the normal curriculum in many schools. These data bases not only provide students with up-to-date information; they allow students to develop their expertise with information handling. Large data bases similar to those used in libraries , such as ERIC, are now also available as CD-ROM discs enabling students to use them without the concerns of time. The Queensland Satellite Trial made some use of data bases and there were positive comments on their application in the evaluation.

South Australia's NEXUS contains databases of AAP news, CES job guide, the King James Bible, ABS census, Famous Australians, Gallipoli 75, etc.

Contact the NEXUS manager (08) 243 5559 f(08) 347 1781. The South Australian Department of Education produces sheets of ideas for using these databases in the classroom.

In NSW plans are afoot for schools to access OASIS (School administration program) LIBRARY data base, browse through the catalogue, order materials and leave messages for the librarian.

The new 'Parliament Stack' and 'Prime Ministers of Australia' are Hypercard style databases for use on a Macintosh (IBM 1992). 'Parliament Stack' is on display at Parliament House in Canberra and is for sale at $50 for use on a Macintosh.

Contact Parliamentary Education Office, Parliament House, CANBERRA, ACT, 2600, (06) 2773508

Classroom ideas

1. Because all the AAP data is available to the user, news stories that often do not reach the pages of the newspaper can still be read. Last evening's AAP stories can be compared with the morning newspaper to observe the editorial selection process or be read before they appear in the paper.

2. News items related to specialist topics can be found using search functions. Many useful articles which would otherwise go unpublished can be used as a teaching resource.

3. The NEXUS AAP database extends back many months allowing the history of an issue to be researched.

3.3.6 Computer-managed learning

This is a technique by which student responses to questions are marked and recorded by a computer. Curriculum management functions (where a student's progress on each task is recorded and easily accessed) was recommended by the Tri-state Project as a means of ensuring continuity of instruction for students who change location in Central Australia. Progress will be recorded on computers in remote sites linked up to a central computer in Alice Springs. When the students arrive at another school they can pick up their lessons where they were interrupted. The software requires an adult to manage the work but not engage in the teaching.

Deakin University is trialling a computer-based tutorial and access system which gives distance students the opportunity to access from home using a modem, bulletin boards, electronic mail, various library catalogues throughout Australia, international databases, off-campus book ordering and to course information. As well as being a teaching medium, such a system puts the student in charge of the selection and use of the information.

In NSW a project, POWER POINT, is being established to use a wide area computer network to link remote schools/students to a centralised education resource centre.POWER POINT has been developed by The Studio of Arts And Sciences and the Electricity Commission of NSW with co-operation of the NSW Department of Education. While the service is initially funded fully, the aim is access for all for the cost of a local telephone call.

Contact Roger Buck, Studio of Arts and Sciences Pty. Ltd.

In Tasmania 41 secondary schools are linked into TASnet and use CARTS (Computer Assessment Recording and Timetabling System). This is an administration system that is used for keeping student personal files and also manage increasingly complex timetable structures. An advantage from the school point of view is that the system comes with a tied and multiplexed 2400 baud line. The result is that schools are exploiting the connection between TASnet and Internet and every student is receiving a global electronic mail box.

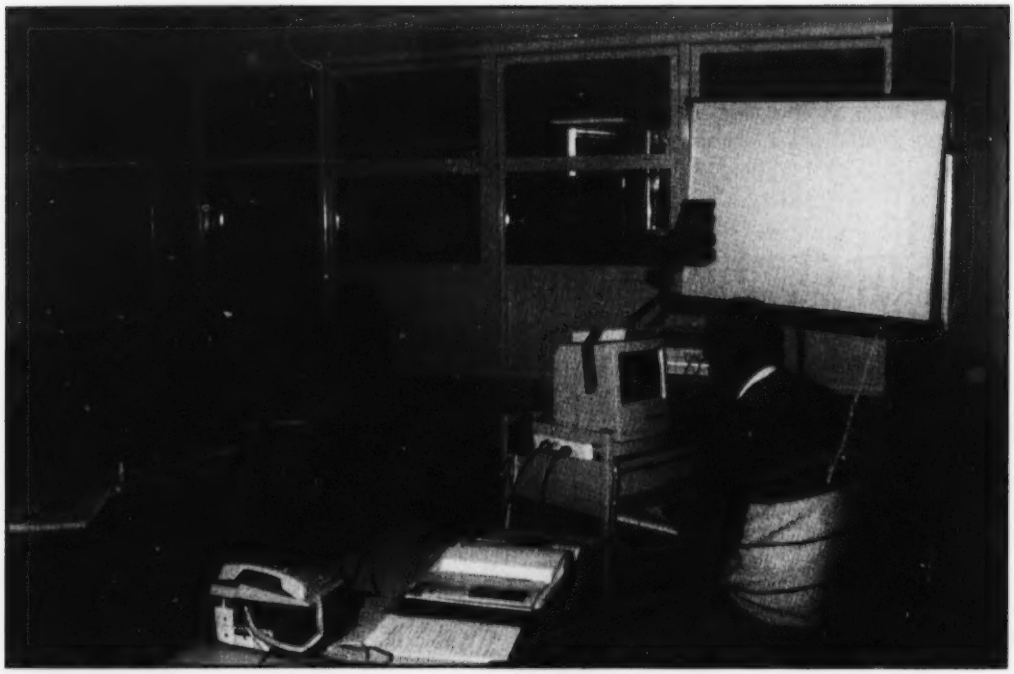
Contact Kim Perkins, Reece High School

3.3.7 Electronic Classroom

Electronic Classroom is an Australian program developed by Revelation Computing Pty. Ltd.. It transforms a Macintosh computer into a computerised blackboard. It has been developed specifically for Australian K-12 distance teaching. Approximately 274 copies (September 1991) have been sold. Teachers are able to draw freehand on the screen with a mouse or pen and graphics or text are transmitted to the schools. Multiple screens of prepared material may be distributed to all participants.

Minimum equipment

- audio facilities to enable voice conferencing between the teacher and students located at each of the participating schools eg. NEC Voicepoint Teleconferencing system, DUCT.
- a fax machine for exchanging lesson notes, handouts and homework
- an Apple Macintosh Plus with 1MB (System 6.0 or later)/Classic
- an AT compatible modem (1200/2400bps) eg. Netcomm Macintosh Modem Pack (Automodem 1234)
- Electronic Classroom software.



Students using Electronic Classroom at Edenhope Secondary College

Optional equipment

- overhead projection panel
- drawing pen and graphic tablet.

Cost

The minimum equipment for both sites can be purchased for less than $7000. The optional projection panel should be less than $2300. Average recurrent costs in Victoria are $2500 - $3500 per school per annum.

Classroom uses

Electronic Classroom has been used to teach a wide variety of subjects, such as Indonesian from Canberra to West Wyalong and Physics from Adelaide to the Riverland district in South Australia. In Victoria at least 22 different subjects are taught using Electronic Classroom.

Typical use:	Daramalan College to St.Mary's Central School, West Wyalong,
Level of students	9
Subject areas	Indonesian
Software	Electronic Classroom
Hardware	Macintosh Plus, Voicepoint, Netcomm modem, Sharp facsimile
Contact person	Yolande Albina Daramalan College

Typical use:	Edenhope Secondary College
Level of students	Year 11
Subject areas	Physics and other VCE subjects
Hardware	Mac/Fax/Duct
Contact person	Ron Cerbasi, Edenhope Secondary College

Typical use:	Kerrie Primary School
Level of students	Year 3/4
Subject areas	Mathematics and some writing activities
Hardware	Mac/Fax/Duct
Contact person	Rob Highland, Kerrie Primary School

Other contacts:	Neil Elliott or Rob Hill, Telematics Operations, Victorian Ministry of Education Greg O'Grady, Queensland Department of Education Geoff Brebner, Balmoral Secondary College Glen Hopner, Merrimac State High School

Approaching Cobar, NSW

3.4 TRANSMISSION LINKS

3.4.1 Telephone line

Transmission is most commonly via the domestic telephone system. Enquiries should be made to the local Telecom office. Current costs for a dedicated telephone line are a minimum of $210 connection fee and $10.46 monthly rental. Telephone handsets and rental are extra.

A teacher at Peak Hill Central School using a multiple telephone link to teach students at four different schools .

3.4.2 Satellite

Although this is expensive it is usually a reliable form of transmission in remote areas. It is used by some TAFE colleges and some government departments. Generally this is regarded as the optimum delivery platform when the costs can be ratiionalised.

3.4.3 Packet radio

This is a system where audio and computer data are transferred using a radio signal. The system can offer reliable transmission at a low recurrent cost. If the user already possesses a computer and an appropriate radio, a packet modem may be purchased for about $300. Trials have been conducted in Victoria and the Northern Territory and investigations are continuing.

Contact Ian Conboy, Victorian Ministry of Education
Graham Anderson, NT Department of Education

3.4.4 Microwave link

The microwave receiver/transmitter at an Adelaide high school

This method uses the 10-11 GHz range but presently is restricted to 'line-of-sight' transmission. This is being used in conjunction with DUCT in five schools in the South West corner of metropolitan Adelaide and in the Riverland schools in South Australia and costs approximately $10-15,000 for equipment and towers at each end with minimal running costs.

Contact Communications Branch, South Australian Department of Education.

3.4.5 ISDN

This is an upgraded telephone network (**I**ntegrated **S**ervices **D**igital **N**etwork) with digitalised exchanges and links. It is able to support a wide range of services including voice and data. ISDN Microlink is needed to convey video other than via satellite. Users access ISDN by a set of interfaces which then allow independent developments such as terminal equipment, and in the network itself, such as transmission, switching and signalling equipment, within a common framework.
It makes possible the transmission of voice, data and video for electronic learning. ISDN is viewed by many as the long term solution to the problem of providing for the emerging range of communication services required.

Using fibre optic cables, Light TAFE College north of Adelaide is able to link its three campuses with Adelaide College of TAFE. The system coder/decoder converts analogue television pictures into a compressed form as digital information to be transmitted via a two megabit fibre optic telephone cable. Simultaneous pictures are displayed from each campus source. Charges start at $360 for installation and $864 per annum to link two sites. For details and charges telephone 008 035 063.

Contact Telecom ISDN Services Product Group, (008) 035 063

3.4.6 HF/VHF radio

Originally the Schools of the Air transmissions were made on a restricted number of shortwave frequencies between 5 and 7Mhz. HF equipment still in use from Dubbo School of Distance Education is supplied by Codan Pty.Ltd.

*For **HF** enquiries contact Tim McLeod, Port Augusta School of the Air.*

UHF transmission at Port Augusta School of the Air

To increase the quality of reception and increase the number of available frequencies new and old stations are using the low VHF bands together with existing towers, huts and power (such as is already available through the Telecom trunking network). Links from these remote sites are then provided back to the teaching centres via leased lines or direct radio channels. The outstations require a tower (ranging from 6m - 18m), a mobile television-like antenna and VHF transceiver. The VHF equipment in NSW includes:

- Unilab radios at repeater sites
- Motorola radios at homesteads
- TARA interfaces for radio/telephone links
- studio facilities designed and assembled by Telecom Australia.

*For **VHF** enquiries contact*
(Technical information) - Phil Brady, MIS Directorate, NSW Dept of School Educatiion
(Structural application) - Julie Johanson, Cobar Distance Education Centre.

4. CONSIDERATIONS

Using telecommunications, electronic media or computers presents the opportunity to employ new methods of teaching and learning. Their use in schools should be examined in the light of the curriculum and the special needs of isolated children. It is a challenge to new and experienced teachers alike. It is also clear that while some teachers are provided with extensive support, others are left to experiment alone.

The following is a brief summary of some points to consider:

- technology can be used as an information source with the teacher becoming the activity director and facilitator as students learn to sift and sort large bodies of information and analyse relationships within that information;
- a considerable amount of co-operative planning is required to ensure technologies are intergrated into the curriculum;
- new opportunities are provided for teachers to review and develop their curriculum and teaching techniques;
- there must be a long term commitment to professional development;
- teachers need a forum to share successes and failures;
- teachers need to enable their students to become team learners using co-operative learning and peer tutoring ;
- teachers can use the technology to facilitate both individual and small group work;
- students are encouraged to take greater responsibility for their learning;
- there are many teaching techniques that are specific to these technologies and the Telematic Teaching notes from the Western Region Access Program give some examples (Appendix C). Also the Education Department of South Australia runs courses on Audio teleconferencing:an introduction to successful audio teleconferencing.

Contact Educational Technology Centre, South Australian Department of Education.

4.1 Curriculum ideas

One useful publication is Classroom ideas for: telecommunications issued by the Miller Computer Centre, NSW Department of Education, Miller Road, Miller, NSW, 2168. This contains many worthwhile suggestions for integration as well as the associated charges and costs. (Cost of the book is less than $10.)

"Teleliteracy for global understanding: Computer Pals Across the World", Unicorn, 15 (4), 204-208 is helpful for electronic mail.

A more detailed book from the USA is Y. Andres' TeleSensations: the educators' handbook to instructional telecomputing, FrEdMail Foundation, 1990 for $49.95. Available from FrEdMail Australia.

4.2 Professional Development models

It was observed that the type of professional development provided for teachers using these new technologies varied widely between states, territories and regions or clusters. Most teachers contacted commented on the value of this support not only before but while teaching, with new technologies. Some of the models noted during this survey are listed below.

1. No Support

   In a number of cases teachers using telecommunications or electronic learning had not undergone training at all. However in some of these cases training is now being planned.

2. Brisbane Catholic Education Office

   One initial training day, follow-up visit and later another follow-up visit. Training manuals and disks are being prepared.

3. Gold Coast Education Centre

   Eight days over six months, loan of a Macintosh, printer, paper and software for personal use during that time.

4. Victorian DEBIT (Distance Education By Interactive Telematics) Conferences

   These are conferences for teachers who will be using telematics in the following year. They have proved to be very successful and valuable.

4.3 Costs

It is difficult to develop an accurate cost effectiveness plan for the use of telecommunications and electronic learning for isolated students. The cost of components of an individual's education can be calculated but to put a dollar value on the educational worth is unacceptable. However not to take costs into account is unrealistic. Where possible throughout this booklet costs of equipment and charges have been given. It is left to the reader to weigh up the advantages and disadvantages of different methods of delivering the curriculum in specific cases.

Costs which are important to consider are:

- hardware
- software
- planning the academic program
- materials production - written, audio, visual
- distribution by mail, broadcast, fax
- professional development
- subscriptions, storage, access to services
- student support system - visits, tutors, tele-tutorials
- the lesser costs in provision of laboratories, student travel, teacher travel.

Some useful cost analyses have been done in the provision of tertiary distance education courses. (Atkinson (1988), Dekkers (1988))

It is worth noting that a report was commissioned by the Department of Employment, Education and Training on Cost effectiveness of printed study materials, supplemented by other media, for external study in 1988. The report concludes that, "the relative cost of providing computer managed learning and telephone tutorials, and the learning advantage which they seem to confer, is not large".

5. OVERVIEW: STATE AND TERRITORY INITIATIVES

Throughout Australia many new technologies are being trialled. In some cases these are sponsored by government departments, others initiated by enthusiastic individuals. Some trials are state/territory wide, others are taking place only in isolated areas. The existing range of technologies offers the potential to extend access to education throughout Australia, to broaden the range of courses accessible to students and to improve the quality of student performance.
The following table gives a broad summary of the present situation as seen by the authors during 1991.

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Teleconferencing		#	#	*	#	#		
DUCT		*	#	#	#		#	#
1 way radio		*						
2 way radio		#	#	#	#		#	#
Computer supported learning		*	#	#				
Video conferencing		#	#	#	#			
Microwave video					#			
UHF video				*				
Facsimile		#	#	#	#	#	#	#
Electronic mail	*	#	#	#	#	#	#	#
Bulletin Boards	*	#			#		*	
Electronic Writing Boards					#			
Data bases	#	#	#	#	#		*	#
Computer managed learning			*	*	*			
Electronic Classroom	*	#	#	#	*	*	#	#

widespread
* isolated examples

In late 1990 the Australian Education Council surveyed each state department of education and drew up a table of its findings is presented in Appendix D.

5.1 AUSTRALIAN CAPITAL TERRITORY

* indicates technology/innovation projects are under consideration

There is no direct government initiative to use telecommunications or electronic learning in teaching.

- Kaleen Primary - Computer Pals
- Daramalan College - teaching Indonesian to St.Mary's West Wyalong
- Phillip College - setting up ACT-wide bulletin board
- Belconnen High School - Educational bulletin board
- Hawker College - pen pals to USA
- *Electronic mail for curriculum development (LOTE)

5.2 NEW SOUTH WALES

The state has been restructured with an emphasis on the decentralisation of responsibilities to the regions and their clusters of schools. Distance education has also been decentralised to sixteen Distance Education Centres using a range of telecommunicatiion facilities (VHF radio west of the Dividing Range and tele-conferencing to the east).

- Distance Education Centres use audio tapes, video tapes and teleconferencing.
- School of the Air and far west Distance Education Centres are upgrading radio facilities to VHF
- Eastern Distance Education Centres are using Telecom or commercial teleconferencing facilities
- Newsday is a well-established collaborative state-wide electronic mail project to produce a newspaper.
- Computer Pals at University is operating from the University of Sydney
- 2SER - FM radio broadcasts "Talking to New England", a talkback session with presenters who are distance education lecturers from University of New England. It broadcasts 26 weeks a year with 40 topics each year.
- Electronic Classroom is being trialled in the Ardlethan region.
- Olivetti Optel system is being trialled in the Western Sydney region.
- *A project is being set up using a wide area computer network to link remote schools/students to a centralised resource centre.

5.3 NORTHERN TERRITORY

Telecommunications have been in use in education for many years. Experiments with new technologies continue.

- Correspondence School - Telephone, fax, 2 way radio, *laptop project equips students with a computer for wordprocessing for delivery of assignments.
- Schools of the Air - 2 way radio, *laptops, * electronic mail, 14 transmission schools, 257 receivers, *packet radio.
- Education centres use audio-conferencing, fax, telephone, *electronic mail, *databases.
- Major high schools have links to smaller centres. Heavy emphasis on Macintosh, Computer Pals Across the World.
- Batchelor College uses fax, telephone, *compressed video via satellite, video-conferencing, *interactive computer links between Yuendumu School and NT Open College.

- NT Open College uses telephone, fax, video-conferencing *interactive computer links, compressed video via satellite.

- NT University uses telephone, computer terminal using Timbuktu Remote, Telecom video-conferencing.

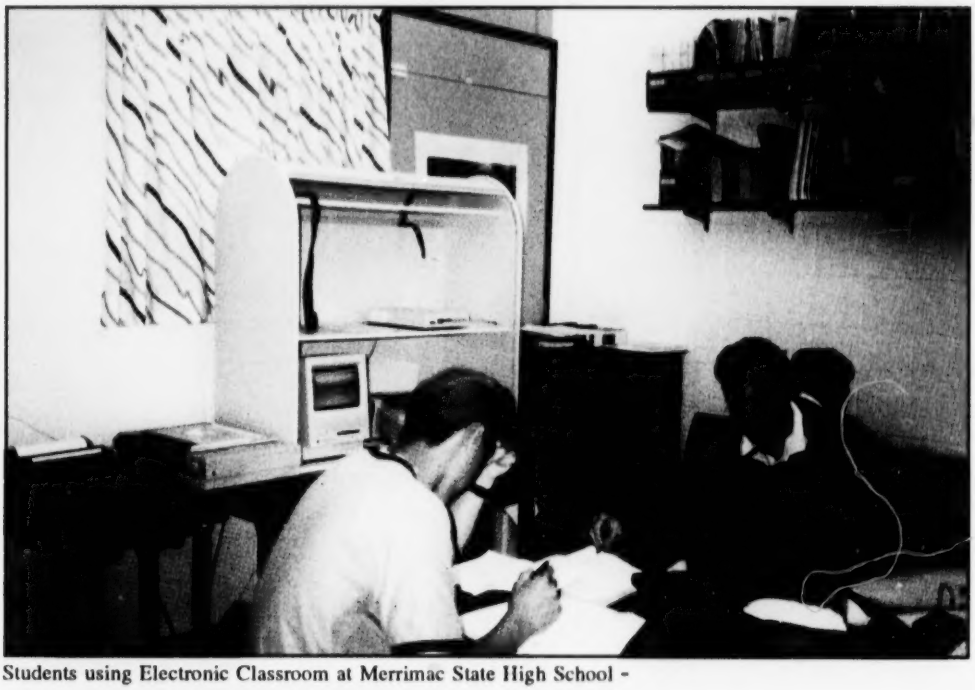
- Imparja - uses TV-Ed educational programs from NSW.

5.4 QUEENSLAND

The state has been restructured into regions which implement telelearning.

- Priority Country Area Program
  - interactive TV, electronic mail and teleconferencing.

- Distance Learning Systems Project for isolated students
  - students receive 'learning packages' , that is are lent computers, software, modems,
    computer programs and audio and video tapes
  - radio and written work
  - computer and Keylink are used for assignments



Students using Electronic Classroom at Merrimac State High School -

- Telelearning
  - networks of computer/telephone/facsimile links
  - provides access to specialist teachers in languages, geography, agricultural science
  - Electronic Classroom is being used in 20 schools
  - electronic white boards
  - electronic mail

- Sunrise Centre is a technology school south of Brisbane
  - each child has his/her own Toshiba laptop computer for use at home and school using Logowriter, Logotype and Newsprint.

- Business Education Centres use a range of modern business technologies. Year 12 Accounting curriculum is being modified to cater for students from the Business Education Centres.

- Electronic Learning Centres
  - primary and secondary
  - schools with an emphasis on computers throughout the curriculum

- Distance Education College:
  - Open Learning Centres (community and industry) linked by electronic mail, fax
  - teleconferencing for TAFE subjects
  - use of audio, video tapes, CML
  - software for learning guides in Competency Based Training Modules
  - 008 online Public Access Catalogue (Library)

- 008 number to Learning systems support

- Satellite Trial 1986/87:
  - small sample (50)
  - audio participation in TV broadcasts
  - video links using AUSSAT
  - computer links and database access

- Remote Area Teacher Education Project (RATEP) at James Cook University and Cairns TAFE in conjunction with Queensland Department of Education
  - teacher education course to Aboriginal and Torres Strait Islanders
  - uses Open learning Centres
  - multimedia interactive software
  - Authorware Professional and multimedia software packages

- James Cook University Tertiary Students
  - teleconferencing/Keylink
  - authoring languages used
  - Computer Pals

- University of Southern Queensland Tertiary students
  - CML remote testing
  - telephone tutorials
  - hybrid teleconferencing equipment

- University of Queensland has produced an Interactive Videodisc on Higher education opportunities

- TSN 11 - Government television network transmits some educational programs via satellite.

- Rural Secondary Schools Support Scheme classes run by Correspondence school in Brisbane

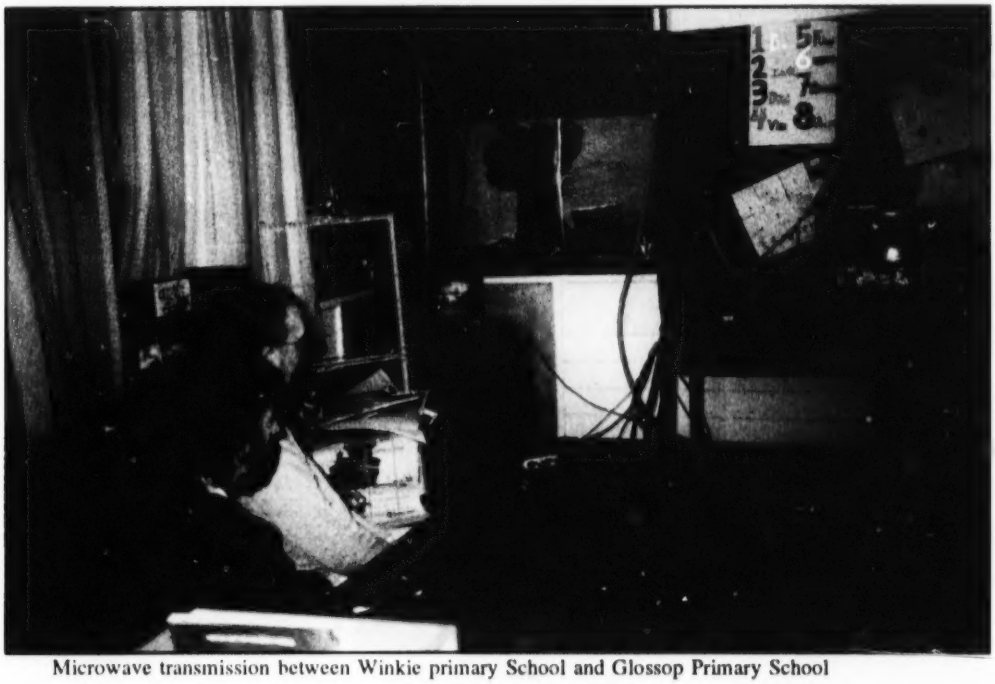
- All schools have access to Education. Qld Keylink network.

5.5 SOUTH AUSTRALIA

Schools have been formed into hubs to facilitate electronic learning. Distance education is handled by the Open Access College.

- Classes within a hub can communicate via DUCT teleconferencing units, computers, electronic whiteboards and facsimile machines.

- Microwave video links operate at Elizabeth Cluster and Riverland



Microwave transmission between Winkie primary School and Glossop Primary School

- Homestead video service provides programs for isolated students enrolled with the Open Access College including the School of the Air campus.

- NEXUS - Electronic educational network set up by Angle Park Computing Centre comprising a database, electronic mail, bulletin board, PRESSCOM (Adelaide Advertiser) , SA career information system and career database.

- TAFE - Interactive television project, talkback television, Learning Centre networks, computer assisted learning via wide area network modem links.

- Tri-State Project - Distance education organisation structures for the centre of Australia . Funding now (1991) is frozen.

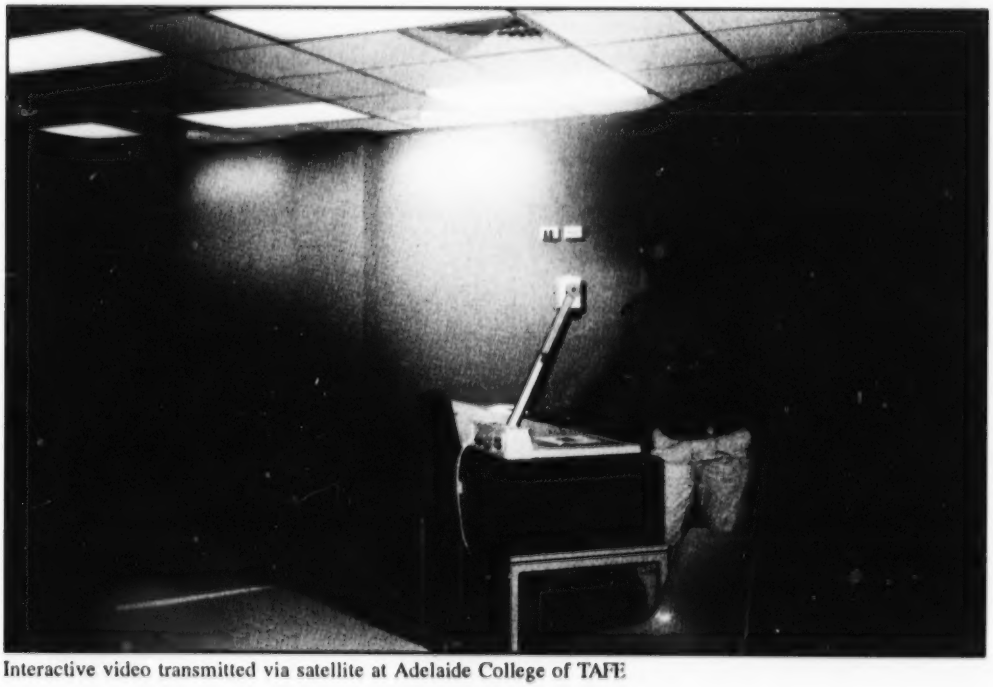
- Fax-net allows rapid facsimile transmission to all schools.

5.6 TASMANIA

TASnet - a 2400 bits per second statistically multiplexed educational network that links all secondary schools via dedicated lines.

AAP
TTNS
electronic mail, and Facsimile machines in all schools.

- Teaching of specialised subjects (eg. LOTES) via teleconferencing.
- Electronic Classroom is in use and will be extended in 1992.
- Electronic Writing board is being trialled.
- Electronic mail and facsimile machines are accessible to isolated students.
- Loan of computers to secondary students.



Interactive video transmitted via satellite at Adelaide College of TAFE

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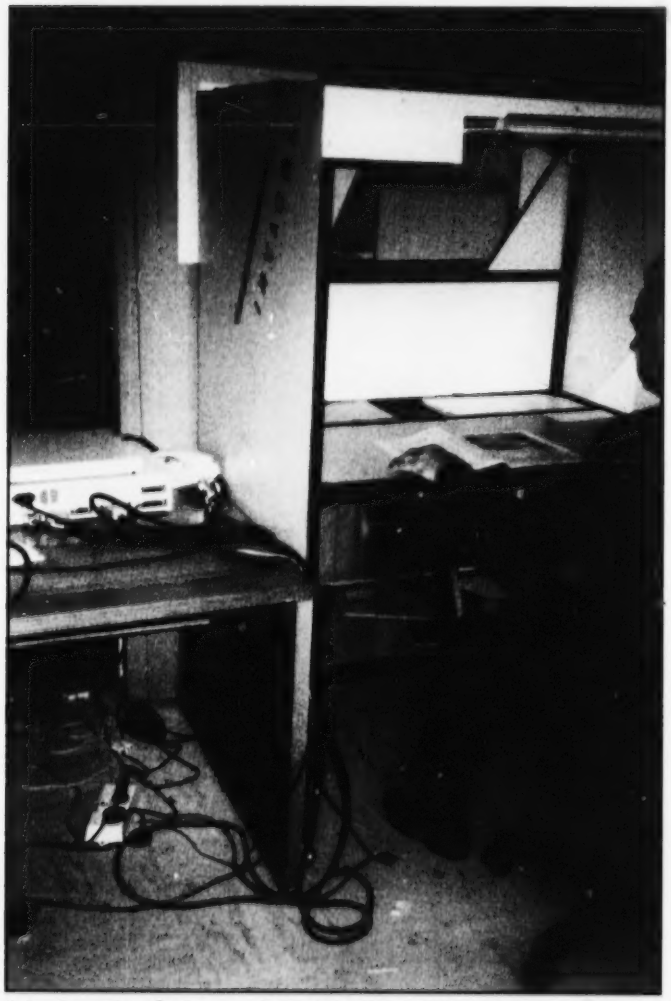
5.7 VICTORIA

In 1986 an agreement was reached between the Victorian Ministry of Education and the Commonwealth Government to initiate a project to increase participation rates at year 11 and 12 in isolated rural schools. The project sought to broaden the subject choices available to students in remote schools by developing electronically-based real time communication systems. Remote schools in common geographical areas formed clusters with the intention of sharing teaching resources. Thus using appropriate technology teachers can simultaneously teach their own students in addition to students in another remote school. For example, Ron Cerbasi at Edenhope Secondary College simultaneously teaches his year 11 Physics class at Edenhope and a student at Balmoral Secondary College 60 kms away. There are three links that comprise this electronic communication system; an audio link, document link and the visual link (These links are described elsewhere in this document).

- Primary Correspondence School uses INVICON as does Telematics.



A teacher using Invicon equipment to relay a video image to another site.

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- Small classes are linked by DUCT, computer, facsimile machine (MAX).
- Sunrise school - teleconferencing phone and facsimile machine.
- A wide variety of support materials, videos and evaluation materials have been developed for use with Electronic Classroom.
- EDMAC Curriculum data base for teachers, access through Keylink. Information concerning jobs and courses.
- VISTEL - a government television communication network.
- Use of TEKPAKS shared between schools (Electronics, Screen Printing, Small Engines).
- Secondary Correspondence School is using audio/facsimile/computer as a component of a wide range of distance courses.
- The linking of music laboratories (Split Site Music) at Casterton and Balmoral using the phone line allows a teacher based in Casterton to hear the students playing the keyboard through the teacher's keyboard.
- Some schools are trialling encyclopaedia based compact disk systems.
- Telematics is viewed as second best to face to face teaching. It does not replace conventional teaching.
- The success of telematics is attributed to:
  - support of real time teaching
  - interactive nature
  - ease of use
  - versatility of telematics equipment (can be fully utilised)
  - teacher control of system
  - the knowledge of the teacher.

5.8 WESTERN AUSTRALIA

- Schools are using DUCT and facsimile machines connected by telephone lines.
- Pilot schools are using DUCT, Electronic Classroom, facsimile machines and graphics tablets
- * Transmitting still camera frames to computers.
- Golden West network - educational TV.
- Infowest - interactive information on TAFE courses.

5.9 NATIONAL

The Australian Education Council has recently undertaken a survey at departmental level of the collaboration of systems in the use of communication technology in distance education. It has presented its report Creating a national communications framework for educational delivery. As a follow-up to this report, the Australian Education Council has established a new working party to explore all aspects of telecommunications delivery of education. This working party is chaired by Mr G.Spring, Secretary, NT Department of Education. The executive officer (for further information) is Graham Anderson, NT Department of Education.

- Telecom is currently installing ISDN lines which, by carrying two-way video signals, will upgrade communications. Presently they connect capital cities but are being extended.

- Telecom network Keylink electronic mail giving access to
  Compass 2000
  Telebox (Germany)
  Computer Pals Across the World
  Home Alone electronic mail.

- CTC static store of information
  electronic mail

- Tertiary institutions are using tele- and video- conferencing for rural and overseas students
  University of Western Sydney, Hawkesbury Campus
  Monash University College, Gippsland
  Deakin University, Victoria

- Country Areas Program provides in the States/Territories support for projects which target rural primary and secondary school students. It assists parents, administrators, teachers and others through local, area and State committees. This assistance allows groups to work cooperatively to improve the delivery of educational services in prescribed country areas by building on existing practice and developing innovative approaches.

6. PROJECTED DEVELOPMENTS

Predicting future trends in technology is a difficult and precarious venture. Some areas are being investigated.

- There is much concern about the need for a national approach to the use of technology in education.
- The Australian Education Council has set up a working party on the collaboration of systems in the use of communications technology in distance education.
- A national telecommunications network is seen to be a high priority.
- The installation of ISDN and Digital Radio concentrator services will improve the quality and cost effectiveness of telecommunications teaching methods.
- The increased quality and decreased cost of codec will enable utilisation of the satellite transmission.
- Intelligent networks which enable students to create dedicated networks of their choosing are being considered.
- Educational television broadcasting is being re-examined.
- There has been a proposal for a new research organisation concentrating on educational telecommunications.
- A national database of courseware and software, similar to NSCU, specifically for tertiary education has been proposed.
- Radio data transmission and facsimile have much to offer School of the Air children.
- An Education Media unit is being considered as part of the Central Australian Aboriginal Media Unit.
- Laser satellite beams are being further investigated (Stalberg, 1987).
- The use of scanners is increasing in Victoria (Elliott, 1990).
- Work is progressing on producing curriculum materials which maximise the potential of the electronic media.
- The use of Keylink as a regular form of communication between travelling students and schools or distance education centres is being investigated.
- Victoria is using satellite to deliver professional development to schools in the Loddon Campaspe region. This system provides one way video and two way audio.

7. SOME ISSUES AND CONCERNS

Technology has been shown to assist in overcoming educational difficulties for many students not only those in remote areas. The use of this technology can encourage students to take more control of their own learning as well as helping to provide new opportunities for extension and enrichment. Most educators agree that the use of technology should be curriculum driven and while this technology can offer new and exciting learning experiences it is vital that developments are carefully evaluated.

Our discussions with people involved in this area has raised many issues and concerns and we briefly summarise some of these below;

- Limited communication between states/territories has allowed many teachers to re-invent the wheel with respect to some of these technologies.

- There is a need to continue to develop teaching/ organising strategies that maximise the effectiveness of these technologies and it is crucial that opportunities are provided to allow ideas to be shared and discussed.

- There is a clear need for on-going professional development that begins at the pre-service level.

- Funding bodies and policy support units must adopt longer term views of the development of these technologies in remote education.

- There has been little formal evaluation of the educational outcomes and cost-effectiveness. These evaluations must be both formative and summative.

- There is an urgent need for research into these styles of teaching and learning. This research must be multi-faceted and developed in consultation with the participants.

8. GLOSSARY

AUSTPAC - packet switching service provided by Telecom.
AUSSAT - the Australian supplier of satellite services.
Baud - is the rate of transfer of data measured in bits per second.
Bulletin board - electronic mail where any other user can read or respond to messages.
Campus 2000 (TTNS) - a UK based multi-facet electronic communication system designed specifically for education providing a variety of databases and allowing children to send email via the international Dialcom system. International subscription is encouraged. For further information contact Helen Milner, Computer Pals Network Liaison Officer.
CD-ROM - similar to the compact disks used to record music but in this case store large amounts of data.
Codec - an encoding/decoding system which converts television pictures between analogue and compressed digital form suitable for transmission over a 2 Mbit capacity fibre optic telephone cable.
Communications software - a program which enables one computer to communicate with another.
Computer Pals Across the World - an electronic mail project offering a variety of curriculum applications including catering for students with special needs.
Country Areas Program - a program operating since 1977, funded through the Commonwealth Department of Employment, Education and Training. It encourages the development of programs by parents, school staffs and local communities which improve the education of students in geographically isolated schools. There are 107 programs funded in SA alone.
Dialcom - an international service supplied through OTC Electronic Trading Pty.Ltd.
Discovery (Viatel) - an electronic database offered by Telecom.
Distance education - education involving a physical separation between student and teacher. It includes open learning, correspondence education and external education.
DUCT - a system developed by the South Australian Education Department. It comprises a terminal plugged into the normal power supply and telephone socket. It provides up to six microphone inputs and an amplification system for a loudspeaker.
Electronic Classroom - a computer program for the Macintosh which enables students to interact with text and graphics by sharing one screen image at up to six remote locations.
Electronic learning - the use of electronic communication equipment in the education process.
Electronic Writing (White) board - a board which displays colour, characters, graphics and drawings handwritten on the whiteboard. The display is seen live on a television monitor or projector screen. The Electronic Writing board is manufactured by NEC.
E-mail or electronic mail - messages are exchanged electronically using a computer.
FORUM - a bulletin board in the EDU.NSW Keylink organisation.
FrEdMail - an electronic mail network which enables schools to send batches of student writing interstate or overseas economically.
ISDN - Integrated services digital network. This is an upgraded telephone network with digitalised exchanges and links. ISDN Microlink is needed to convey video other than via satellite. Charges start at $360 for installation and $864 pa to link two sites. For details and charges telephone 008 035 063.
IVD or interactive videodisc - a disk similar to CD-ROM disk which can hold video images and sound. It is linked to a computer enabling the student to interact through a program.
Keylink - the national electronic mail service which allows mail to be sent between computers via the public telephone network. To join Keylink you should ring 008 02 3223 or write to Keylink, Telecom Australia, GPO Box 740, North Sydney, NSW, 2059. Charges associated with Keylink are standard, whether the users are next door or in another state.

Microwave video link - the video signal from a camera is transmitted to a nearby centre, less than 80 k, and displayed on a monitor in the classroom.
Modem - a device to modulate and demodulate computer signals for transmission along telephone lines. The measure is 300, 1200, 2400 etc. bps. The bps measures bits per second transmitted via the telephone line.
Multipoint - an audio teleconferencing link costing less than $1000 which is used in Western Australia.
Open learning - lack of constraint imposed on study by the limitation of a campus with fixed classroom size, limited resources and staff availability. It encourages self reliance in students.
Overhead data projection panel - a device which enables a computer screen to be projected onto a large screen using an overhead projector. They are available from Electroboard, Kodak, Sharp and 3M.
Talkback television - linking students by television, video data and the telephone from electronic classrooms.
Telecommunications - a system which embraces telephone line, cable and satellite links to communicate between parties by computer, audio or visual means.
Telecomputing - a system which uses telecommunications and computers.
Teleconferencing - the linking of three or more people by telephone in two or more locations.
Telematics - learning through telecommunications.
Tele-education - the application of telecommunications and computer technology to education.
Timbuktu Remote - a computer program which enables Macintosh users to take control of and interact with other 'remote' computers.
VHF - very high frequency radio transmission.
Voice point - an NEC audio teleconferencing link costing Approximately $2200 which is used in some schools in NSW and ACT.

Approaching East Murray Area School

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Videos

Teaching by Telematics[3]

Teaching with Telematics: an evaluation[3]

Teaching Strategies[3]

Journals

Computer Pals Newsletter
FrEdMail News
Research in Distance Education
Distance Education

1 *available from Alice Springs Education Centre, PO Box 1420, ALICE SPRINGS, NT, 0871., telephone (089) 52 5044, fax (089) 52 7210.*

2 *available from FrEdMail Australia, PO Box 649, MITTAGONG, NSW, 2575*

3 *available from Neil Elliott, Telematics Operation, Halvin Street, Bendigo, Vic, 3550, (054) 403139*

4 *International Secretariat of Computer Pals Across the World, PO Box 280, MANLY, NSW, 2095*

APPENDIX A

EDUCATIONAL RADIO STATIONS

2MCE-FM c/- Charles Sturt University - Mitchell BATHURST NSW 2795	Comrie Bucknell Station Manager (063) 332790/332360/332774 /332888
2NUR-FM University of Newcastle NEWCASTLE NSW 2308	Brett Gleeson Station Manager (049) 685713 103.7
2SER-FM PO Box 123 BROADWAY NSW 2007	Kaye Blackman Station Manager (02) 2816333 107.3
5UV 228 North Terrace ADELAIDE SA 5001	Jeff Langdon Manager (08) 2285000 531
3RRR-FM PO Box 304 FITZROY VIC 3065	Lucille Rogers Manager (03) 4192066 102.7
6NR GPO Box U 1987 PERTH WA 6001	Ian Hill Manager (09) 3512121 927
6UVS-FM c/- University of Western Australia NEDLANDS WA 6009	Manager (09)3803380/3802980(st) 92.1
2WEB PO Box 426 BOURKE NSW 2840	Ian Cole Manager (068) 72 2333, fax (068) 72 2810 585

APPENDIX B

NEWSDAY

NEWSDAY is an Australia wide project on Keylink which simulates newspaper publishing. The concept was originated in Great Britain by Campus 2000 (formally TTNS). They have produced several booklets and videos on the organisation and curriculum aspect of running a newspaper day in schools.

Contact Helen Milner, TTNS

On a day designated as Newsday students publish a newspaper..On the days leading up to Newsday students write, research, edit, discuss, make decisions then download their selected items to NEWSDAY on Keylink. On NEWSDAY they have access to all the items from other schools around Australia and some from overseas. Each school then produces an up-to-the-minute newspaper literally 'hot off the press'. In this way the bulletin board simulates a real news wire service giving the students the opportunity to edit, publish or reject news in the same way as commercial newspapers. Schools are urged to send copies of their papers to schools which contributed articles enabling them to see their articles in print.

NEWSDAY is aimed at secondary and primary schools across Australia. Such an activity offers an enormous scope to teachers in many curriculum areas. It is difficult to nominate all possible educational benefits since much depends on individual classroom and project management, but they include:

reading
process writing
keyboard skills
study of mass media
interpretation and validatiion of information
co-operation between students working on a joint project
working to a deadline
production of a meaningful project.

Contact Vicki Lowery, NSW Department of Education.

NEWSDAY now runs as an international project on FrEdMail.

Contact Greg Butler, University of Western Sydney

Publications such as Using NEWSDAY.QLD by the Educational Services Department of Queensland Newspapers Pty. Ltd. are useful in giving classroom ideas.

Contact Terry Grogan, Executive Officer Information Technology

APPENDIX C

TELEMATIC TEACHING

INTRODUCTION

Teaching telematically is a new experience for all of us, and at the end of one year's teaching it is appropriate to look at methods and ideas that seem to work. These observations are from the questionnaires that students and teachers completed in term 3, discussion with staff members, and ideas that were given by Chris McDermott at the Forbes Conference.

TEACHING TECHNIQUES

1. Student involvement

When teaching telematic lessons there needs to be a realisation by the teacher that we have to compensate for the lack of eye contact. This means that there must be other methods used during the lesson to involve students.

It is essential that students are made to feel welcome and that their opinions are worthy to be heard.

In this context the following points are ways in which this can be achieved.

a) **Lesson start** At the beginning of a lesson, all students need to be welcomed - either by questions or as a roll call. It is best if students answer for themselves, then the teacher has made **personal** contact with each student. This is of course not possible if there is a large number of students involved.

b) **Questioning** Students need to be constantly referred to by name. General questions are not useful because of the indecision as to who is going to answer it. This could then be followed by requesting responses from other students. Although this is general classroom practice, it is especially important in this mode of teaching. In the questionnaires that have been filled in by students, they refer over and over to the essential personalising of a lesson - otherwise they switch off.

c) **Other ideas** for involvement by the student are

(i) Filling in worksheets during the lesson.
(ii) Discussions - best only with small groups.
(iii) Completing worksheets or problems beforehand and discussing them in class (this has the problem that some students may not have it ready and this tends to disrupt the plan of the lesson). Another variation of this is to give specific questions to different students to be presented at the next lesson. With both of these ideas, it is important that the answers are not too long or the element of discussion and involvement is lost again.

2. Guidelines

Students need clear guidelines as to what work is expected of them. To this end it is useful for them to have regular faxes (possibly once a week) explaining what is to be done during that time period.

3. Lesson plans

In most cases it is necessary to let students know the plan for a telematic lesson beforehand. There are several ways in which this could be done. Firstly, by including on a weekly fax (as mentioned above) generally what will be happening in the telematic lessons; secondly, when students have less face to face contact in the school, they need in more detail lesson by lesson detail as to what their telematic is going to be covering; or

thirdly, the information can be given verbally from one lesson to the next as to what that lesson is going to cover. The format depends very much on factors such as face to face contact with teachers in their own school, the subject matter, and the number of students involved in a subject.

4. Number of Telematics

Subjects where there are a large proportion of face to face lessons within a school may find they need less telematic time. It has been stated by students that it is disruptive to a 40 minute lesson with a teacher, to have to break off for a telematic lesson.

5. Personal contact

It is essential at the earliest opportunity to meet with your students, and be aware of the possibility of having to meet students at other times of the year. The initial meeting should be able to take place via a WRAP camp. There is one held for all l Year 11 and 12 students early in 1991. It is very important that staff and students use this camp to become known to each other.

LESSON GUIDELINES

The following hints are suggestions to make your lessons run smoothly and to keep your students interested and keen!

1. Always be on time for lessons - if you cannot be, arrange for one of your students to ring in on time for you.

2. If line quality is poor, hang up and redial.

3. Ensure students are on time. If they are constantly late, or absent, contact the school involved.

4. Find out who is absent and keep a record of absentees from each lesson.

5. Have all the material you need ready, and any material the students need for the lesson faxed through to them well before the lesson is due to start.

6. Talk clearly, evenly and not too rapidly.

7. Be confident.

8. Avoid monologues without regular input from the students.

9. Provide time if possible for student enquiries or questions at the end of a lesson.

10. Try not to use one word responses - encourage the students also in this. This is because the voice activated equipment has a small time delay, causing the beginning of words to be slightly clipped.

11. Students need some sort of feedback to any responses they make - maybe just a simple "thanks Henry".

Ros Bell, Peak Hill Central School, Nov 1990.

APPENDIX D
SPECIFIC EDUCATIONAL APPLICATIONS USING TELECOMMUNICATIONS

The following table was drawn up by the Australian Educational Council for its report on "Creating a national communications framework for educational delivery", 1991.

EDUCATIONAL INITIATIVES	TELECOMMUNICATIONS TECHNOLOGIES IN USE			
	TV/Video	Audio (incl. radio)	Facsimile	Computer/ Whiteboard
ACT				
Electronic Classroom Program		X	X	X
Northern Territory				
Schools of the Air/Secondary Correspondence	X (By Post)	X	X	X
Compressed video trials (TAFE)	X			
Queensland				
Telelearning Project (8&11)		X	X	X
Distance Learning Systems				X
Victoria				
RA3 Program (Audiographic Systems)		X	X	X
Western Australia				
West Ed Media	X	X	X	X
Professional Development Programs	X	X	X	X
Tasmania				
Indonesian Language Program		X	X	
New South Wales				
Schools				
Decentralisation of Distance Education	X	X	X	X
- VHF Radio Network (PS-6)		X		
- Telephone Voice Conferencing Networks (PS-12)		X		
- Video Curriculum Support Scheme	X (By Post)			
- Distance Education Keylink Program				X
Year 11/12 Access Program		X	X	X
Staying-On-Program		X		X
TAFE				
Satellite delivery of courseware	X	X		
Electronic Mail Program				X
Facsimile Support Program			X	
Teaching by Videoconference	X	X		
South Australia				
Brownswell trial		X	X	X
South West Schools trial	X	X	X	X
Everland trial		X	X	
Riverland trial	X	X	X	X
DIMITY		X	X	X
OPEN ACCESS	X	X	X	X
FM Subcarrier Trial		X	X	
Kangaroo Inn		X	X	X

APPENDIX E

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